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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Jeffrey C. Hood
Meyertons, Hood, Kivlin, Kowert & Goetzel, P.C.
P.O. Box 398
Austin, TX 78767

EXAMINER	
NGUYEN, PHU K	
ART UNIT	**PAPER NUMBER**
2628	

DATE MAILED: 06/02/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/715,899	Applicant(s) DEERING, MICHAEL F.	
	Examiner Phu K. Nguyen	Art Unit 2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15,24-29 and 33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15, 24-29, 33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Phu Nguyen

PHU K. NGUYEN
PRIMARY EXAMINER
GROUP 2300

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-15, and 24-29, 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over FORAN et al. (6,072,500) in view of LIN et al. (A Parallel Rendering Approach to the Adaptive Supersampling Method).

As per claim 1, Foran teaches the claimed "graphics system" comprising: "a graphics processor configured to render a plurality of samples for an image; wherein said image is subdivided into a plurality of regions" (Foran, supersampling coverage mask which defines the supersampling region; column 7, lines 19-30); a sample buffer coupled to said graphics processor for storing the plurality of samples (Foran, image processor buffer 52; column 5, lines 41-65); and a sample-to-pixel calculation unit coupled to said sample buffer, wherein said sample-to-pixel calculation unit is configured to select samples from sample buffer and filter said samples to form output pixels, (Foran, image processors 60; column 6, lines 9-32). It is noted Foran does not teach "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" as claimed. However, Lin teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Lin, page 513, figure

2b; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample). Lin teaches "when scan-converting a polygon, if the polygon covers the whole pixel, we sample the pixel only once. If the polygon partially covers the pixel, we perform a supersampling of that pixel" (Lin, page 612, lines 21-23); in other words, Lin's adaptive supersampling method varies sampling density by region in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample.It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

RESPONSE TO APPLICANT'S ARGUMENTS:

Applicant's arguments filed on March 3, 2006 have been fully considered but they are not deemed to be persuasive. Applicant argues that the definition of "region" must be according to Applicant's disclosure (page 32, lines 5-14); specifically,

"If the graphics system implements variable resolution super sampling, then the triangles are compared with the sample density region boundaries (step 208B).
In variable-resolution super-sampled sample buffer implementations, different regions of the display device may be allocated different sample densities based upon a number of factors (e.g., the center of the attention on the screen as determined by eye or head

tracking). Sample density regions are described in greater detail below (see section entitled Variable Resolution Sample buffer below). If the triangle crosses a region boundary (step 210), then the triangle may be divided into two smaller polygons along the region boundary (step 212). This may allow each newly formed triangle to have a single sample density."

The issue is whether the term "region" in the claims should be interpreted as general meaning as in dictionary or in a more specific and limited meaning in Applicant's disclosure. Further guidance in interpreting the scope of equivalents is provided in MPEP Sec. 2181 through Sec. 2186. While it is appropriate to use the specification to determine what applicant intends a term to mean, <u>a positive limitation from the specification cannot be read into a claim that does not impose that limitation</u>. A broad interpretation of a claim by USPTO personnel will reduce the possibility that the claim, when issued, will be interpreted more broadly than is justified or intended. An applicant can always amend a claim during prosecution to better reflect the intended scope of the claim. Accordingly, the claimed term "region", not as a mean-plus-function term, should be given a general meaning which can be read on the area on the edge of the polygon in Lin reference.

Claim 2 adds into claim 1 "wherein said graphics processor is configured to vary the density of the samples generated within at least a particular one of plurality regions on a basis selected from the group consisting of: a per-scan line basis, a per-group-of-scan-line basis, a per-region basis, a per-pixel basis, and a per-group-of-pixel basis"

which Foran does not explicitly teach. However, Lin teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Lin, page 513, figure 2b; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample). It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Claim 3 adds into claim 1 "wherein said density of samples per pixel for at least one of plurality regions is based one or more of the following: input from an eye-tracking device, input from a head-tracking device, input from a hand-tracking device, input from a mouse, a cursor position, a visible object position, and a main character position" which Foran teaches in column 3, lines 50-54, column 4, lines 11-30 in which the input is from host computer 10 with the polygon information.

Claim 4 adds into claim 1 "said density samples per pixel for at least one of plurality regions is varied according to input from a gaze tracking device" which Foran does not explicitly teach. However, given Foran's graphics processor 10, it would have been obvious to a person of ordinary skill in the art to have the input with varied density from a gaze tracking device because the accuracy and easy manipulation of the gaze

tracking device.

Claim 5 adds into claim 1 “said density of samples per pixel for at least one of plurality regions is is selected from a predetermined set of densities” which Foran does not teach. However, Lin teaches that such “variable density of samples per pixel, wherein the density varies by region” is well known in the art (Lin, page 513, figure 2b with at least two sampling densities – one for a pixel not on the edge and supersampling rate for a pixel on the edge; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample). It would have been obvious to use an adaptive supersampling method for “variable density of samples per pixel, wherein the density varies by region” because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Claim 6 adds into claim 1 “said density of samples per pixel is substantially continuously variable across one or more frame region boundaries” which Foran does not explicitly teach. However, given Foran's antialiasing technique, it would have been obvious to have the density being substantially continuous because it reduces artifacts by smoothing the appearance of the displayed image.

Claim 7 adds into claim 1 “said sample-to-pixel calculation unit is configured to filter samples to form output pixels on a real time basis” which Foran teaches in column 14, lines 6-26 in which the speed of operation significantly improves.

Claim 8 adds into claim 1 “said sample-to-pixel calculation unit is configured to filter samples to form output pixels on an on-the-fly basis” which Foran teaches in column 13, lines 37-55.

Claim 9 adds into claim 1 “at least a part of each sample is double-buffered in said sample buffer” which Foran does not explicitly. However, given Foran's image buffer for graphics data, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the double-buffer for storing data because it reduces the processing time by allowing simultaneously read and write operations perform on the buffer.

Claim 10 adds into claim 1 “a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store information usable to determine sample positions for each sample rendered for a particular pixel position” which Foran does not explicitly teach. However, Lin teaches that such “information usable to determine sample positions for each sample rendered for a

particular pixel position" is well known in the art (Lin, page 513, figure 2b for "selecting only the bins corresponding to the area the polygon covers the pixel"; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled and the sample positions are distributed over the pixel on the edge). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel" and "variable density of samples per pixel, wherein the density varies by region" because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Claim 11 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store one or more sample position schemes, and wherein said graphics processor is configured to read sample positions from said sample position memory" which Foran teaches in column 5, line 66 to column 6, line 32.

Claim 12 adds into claim 1 "a sample position memory coupled to said graphics processor, wherein said sample position memory is configured to store one or more sample position schemes for one or more sample densities, wherein said graphics processor is configured to read sample positions from said sample position memory according to a selected sample density and a selected sample position scheme" which

Foran teaches in column 5, line 66 to column 6, line 32; column 7, lines 31-49.

Claim 13 adds into claim 1 "said graphics processor is configured to store samples in said sample buffer according to bins, wherein each bin has a position, wherein each sample within a bin is assigned an offset relative to said bin positions, and wherein said bin positions correspond to pixel positions on a display device" which Foran does not teach. However, given Foran's image region memories 52, it would have been obvious to arrange the memory into the sections such as bins or bit map in which the bin's position correspond to the pixel's offset position on display because it increases the memory access time by allowing a group of pixel data to be processed simultaneously.

Claim 14 adds into claim 1 "said bin positions corresponds to pixel positions on a display device" which Foran does not explicitly teach. However, Lin teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Lin, page 513, figure 2b with bin position is decided by how much the edge covers the pixel). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel" because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Claim 15 adds into claim 1 "the specified portion varies by region" which Foran does not teach. However, Lin teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Lin, page 513, figure 2b with bin position is decided by how much the edge covers the pixel and at least two sampling densities – one for a pixel not on the edge and supersampling rate for a pixel on the edge; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel" and "variable density of samples per pixel, wherein the density varies by region" because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Claims 24-25 claim method based on the system of claims 1-19; therefore, they are rejected under the same reason (see also Foran, column 15, lines 37-42).

Claims 26-28 claim a graphics system based on the graphics system of claims 1-18, therefore, they are rejected under the same reason.

Claim 29 adds into claim 27 "the specified portion for each region is determined by input from a tracking device" which Foran does not teach. However, Lin teach that a tracking means for tracking the regions of a polygon such as edge or non-edge regions is well known in the art (Lin, page 513, figure 2b with tracking technique to perform at least two sampling densities – one for a pixel not on the edge and supersampling rate for a pixel on the edge; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample). It would have been obvious to use an adaptive supersampling method for "tracking the variable sampling regions, wherein the density varies by region" because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Claim 30 is similar to claim 28 but specifies that the samples for supersampling rate is N and the number of samples used for calculating is less than N which Foran does not teach. However, Lin teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Lin, page 513, figure 2b with bin position is decided by how much the edge covers the pixel and at least two sampling densities – one for a pixel not on the edge and supersampling rate for a pixel on the edge; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while

pixels for the region not including an edge have only one sample). It would have been obvious to use an adaptive supersampling method for "selecting only the bins corresponding to the area the polygon covers the pixel or using less than the super samples for each pixel" and "variable density of samples per pixel, wherein the density varies by region" because provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

As per claim 33, Foran teaches the claimed "graphics system" comprising: "a graphics processor configured to render a plurality of samples for an image; wherein said image is subdivided into a plurality of regions" (Foran, supersampling coverage mask which defines the supersampling region; column 7, lines 19-30). It is noted Foran does not teach "a density of samples per pixel for at least one of the plurality of regions is different from a density of samples per pixel for at least one other of the plurality of regions" as claimed. However, Lin teaches that such "variable density of samples per pixel, wherein the density varies by region" is well known in the art (Lin, page 513, figure 2b; the adaptive supersampling method in which the pixels on the region including the edges of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample). Lin teaches "when scan-converting a polygon, if the polygon covers the whole pixel, we sample the pixel only once. If the polygon partially covers the pixel, we perform a supersampling of that pixel" (Lin, page 612, lines 21-23); in other words, Lin's adaptive supersampling method varies sampling density by region in which the pixels on the region including the edges

of polygon have large sampling density or supersampled while pixels for the region not including an edge have only one sample.It would have been obvious to use an adaptive supersampling method for "variable density of samples per pixel, wherein the density varies by region" because it provides a considerable amount of saving in both memory and processing time compared to the traditional supersampling method (Lin, page 512, lines 18-21).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Phu K. Nguyen whose telephone number is (571) 272 7645. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Razavi can be reached on (571) 272 7664. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Phu K. Nguyen
May 21, 2006

Phu Nguyen

PHU K. NGUYEN
PRIMARY EXAMINER
GROUP 2300